CLAIMS

1.   A method comprising:

providing a navigation tree comprising a semantic, hierarchical structure, having one or more paths associated with content of a conventional markup language document and a grammar comprising vocabulary including one or more keywords;

receiving a request to access the content; and

responsive to the request, traversing a path in the navigation tree, if the request includes at least one keyword of the vocabulary.

2.   The method of claim 1, wherein the vocabulary dynamically changes based on the path traversed in the navigation tree.

3.   The method of claim 1, wherein the grammar further includes one or more rules corresponding to said one or more keywords of the vocabulary, the method further comprising:

retrieving the content according to one or more rules corresponding to said at least one keyword included in the request.

4.   The method of claim 1 wherein the request is in the form of speech.

5.   The method of claim 1 further comprising:

determining if the request for accessing the content includes at least one keyword of the vocabulary by searching the vocabulary to find a match for said at least one keyword in the request.

6.   The method of claim 5 further comprising:

confirming that the match for the keyword is correct; and

traversing the path in the navigation tree to retrieve content related to said at least one keyword in the request.

7.   The method of claim 6 further comprising:

providing a prompt including one or more keywords of the vocabulary if a match for the keyword is not found.

5   8.   The method of claim 7 further comprising:

traversing a path in the navigation tree to retrieve content related to a keyword selected from said one or more keywords included in the prompt.

9.   The method of claim 1 further comprising:

10   narrowing the vocabulary of the grammar if the request does not include at least one keyword of the vocabulary.

10.   The method of claim 9 further comprising:

providing a prompt including one or more keywords of the narrowed

15   vocabulary; and

traversing a path in the tree to retrieve content related to a keyword selected from said one or more keywords in the narrowed vocabulary.

11.   The method of claim 10 further comprising:

20   expanding the vocabulary of grammar based on the path traversed in the navigation tree.

12.   The method of claim 1 wherein the conventional markup language is HyperText Markup Language.

25

13.   A method performed on a computer for browsing content available from a communication network comprising:

receiving a document containing content in a conventional markup language format and a style sheet for the document;

30   generating a document tree from the document;

-77-

generating a style tree from the style sheet, the style tree comprising a plurality of style sheet rules;

converting the document tree into a navigation tree using the style sheet rules, navigation tree associated with a vocabulary having one or more keywords, the navigation tree including one or more content nodes and routing nodes defining paths of the navigation tree, each content node including some portion of the content and a keyword associated with the respective portion of the content, each routing node including at least one keyword referencing other nodes in the navigation tree;

receiving a request to access the content; and

traversing a path in the navigation tree, adding keywords included in any node along the traversed path to the vocabulary in response to the request.

14.   The method of claim 13 wherein the request is in the form of speech.

15.   The method of claim 13 comprising:

generating a first speech recognition result indicating whether the request includes any keyword of the vocabulary;

assigning a first confidence score to the first speech recognition result; and

rejecting the request, if the first confidence score is below a rejection threshold.

16.   The method of claim 11 comprising:

accepting the request if the first confidence score is greater than a recognition threshold.

17.   The method of claim 16 wherein the first confidence score is between the rejection threshold and the recognition threshold, the method comprising searching the vocabulary to find one or more matches for any keyword including in the request.

18.   The method of claim 15 comprising:

providing a first group of keywords included in the vocabulary from which to select if the first confidence score is below the rejection threshold;

generating a second speech recognition result in response to a selection from the first group; and

assigning a second confidence score to the second speech recognition result.

19.   The method of claim 15 wherein generating comprises:

deriving a first phonetic pronunciation based on the request;

deriving a second phonetic pronunciation based on at least one keyword of the vocabulary; and

comparing the first phonetic pronunciation with the second phonetic pronunciation.

20.   A method of claim 19 further comprising selecting a keyword from the vocabulary based on said comparison.

21.   A method of navigating a navigation tree derived from a document having content in conventional markup language format, the navigation tree having a plurality of nodes, the navigation tree associated with a grammar comprising a vocabulary and corresponding rules, said method comprising:

visiting a first node in the navigation tree;

moving from the first node to a second node in the navigation tree in response to the user request, the second node having at least one keyword; and

expanding the grammar by adding to the vocabulary the keyword of the second node.

22.   The method of claim 21, wherein the keyword of the second node identifies content included in the second node.

23. The method of claim 21 comprising providing an error message, if the user request is not recognized.

24. The method of claim 21, comprising:

comparing the request against one or more keywords included in the vocabulary; and

recognizing the request if the request is sufficiently similar to one of the keywords.

25. The method of claim 24, wherein recognizing comprises:

selecting a number of keywords from the vocabulary that are similar to the request;

for each selected keyword, assigning a value to the selected keyword based on how similar selected keyword is to the request; and

recognizing the keyword with the highest value.

26. The method of claim 25, comprising resolving an ambiguity in recognizing the request if the selected keyword with the highest value is below a recognition threshold.

27. The method of claim 26, wherein resolving comprises prompting the user to choose from one of the selected keywords.

28. The method of claim 21, comprising expanding the grammar by adding to the vocabulary any keywords associated with the nodes proximate the first node.

29. The method of claim 21, wherein the grammar is generated after the first node is visited.

30. The method of claim 21, wherein the grammar is generated before the first node is visited.

31.   The method of claim 21, comprising building a greeting based on the keyword of the second node.

5   32.   The method of claim 21, further comprising:

generating a prompt based on the portion of the content included in the first node;

playing the prompt to provide a plurality of options to select from the portion of the content included in the first node.

10

33.   The method of claim 21, wherein the first node is a routing node which refers to other nodes in the navigation tree.

34.   The method of claim 33, further comprising:

15   generating a prompt based on the other nodes referred to by the first node; and

playing the prompt to provide a plurality of options for moving from the first node to one of the other nodes.

20   35.   The method of claim 21, wherein the first node is a form node associated with one or more editable fields.

36.   The method of claim 35, comprising generating a prompt based on the editable fields.

25

37.   The method of claim 36, comprising playing the prompt to provide a plurality of options for selecting from the editable fileds.

38.   The method of claim 36, comprising moving through the editable fields in a
30   prearranged order.

39.   A method of navigating a navigation tree derived from a document having content in conventional markup language format, the navigation tree having a plurality of nodes, the navigation tree associated with a grammar comprising a vocabulary and corresponding rules, said method comprising:

5   visiting a first node in the navigation tree;

moving from the first node to a second node in the navigation tree in response to the user request, the second node having at least one keyword; and

expanding the grammar by adding to the vocabulary the keyword of the second node;

10   indicating that the first node is visited by providing a first message; and

indicating that no user request has been received by providing a second message.

40.   The method of claim 39, comprising providing a third message with one or
15   more options if no user request is received in response to the second message.

41.   The method of claim 39, wherein the first node is a content node having at least a portion of the content, the method comprising:

providing a third message with one or more options to select from the
20   portion of the content associated with the content node.

42.   The method of claim 39, wherein the first node is a routing node which refers to the nodes of the navigation tree, the method comprising:

providing a third message with one or more options for moving to the
25   other nodes.

43.   The method of claim 42, wherein the first node is a form node having one or more editable fields, the method comprising:

providing a third message, with one or more options to select from one or
30   more editable fields.

44.   A method of navigating a routing node in a navigation tree derived from a document having content formatted in conventional markup language format, the navigation tree having a default grammar and a plurality of nodes, each node associated with one or more keywords, said method comprising:

5   visiting a first node in the navigation tree, the first node referencing at least a second node;

generating a navigation grammar by adding to the default grammar one or more keywords associated with the second node;

generating an output message based on said one or more keywords;

10   playing the output message;

waiting to receive a user request responsive to the output message;

matching the request against the keywords included in the navigation grammar;

recognizing the request, if a match is found between the request and one or

15   more of the keywords included in the navigation grammar;

rejecting the request, if a close match is not found; and

resolving ambiguities in the request, if the request is neither recognized nor rejected.

20   45.   The method of claim 44, wherein the navigation grammar includes rules corresponding to said one or more keywords, the method further comprising:

visiting the second node based on navigation rules corresponding with the keyword matched with the request, if the request is recognized.

25   46.   The method of claim 45, wherein the second node references at least a third node associated with one or more keywords, said method further comprising:

expanding the navigation grammar by adding to the navigation grammar the keywords associated with the third node.

30   47.   The method of claim 45, further comprising:

narrowing the navigation grammar by deleting from the navigation grammar the keywords associated with the second node; and

expanding the navigation grammar by adding to the navigation grammar keywords associated with the third node.

48. The method of claim 44, further comprising:

waiting to receive a user request regardless of whether or not the output message is generated or played.

49. The method of claim 45, further comprising:

initializing a timeout counter when visiting the second node.

50. The method of claim 48, further comprising:

playing a first timeout message, if a first time period has passed and no user request is received; and

incrementing the timeout counter.

51. The method of claim 50, further comprising:

playing a second timeout message, if a second time period has passed and no user request is received, wherein the second timeout message is different from the first timeout message; and

incrementing the timeout counter.

52. The method of claim 51, further comprising:

playing a last resort timeout message, if the timeout counter has reached a threshold value.

53. The method of claim 45, further comprising:

initializing a help counter when visiting the second node.

54. The method of claim 53, further comprising:

playing a first help message, in response to a first help request submitted while visiting the first node; and

incrementing the help counter.

55. The method of claim 54, further comprising:

playing a second help message, in response to a second help request submitted while visiting the first node, wherein the second help message is different from the first help message; and

incrementing the help counter.

56. The method of claim 55, further comprising:

playing a last resort help message, if the help counter has reached a threshold value.

57. The method of claim 45, further comprising:

initializing the rejection counter when visiting the second node.

58. The method of claim 57, further comprising:

playing a first rejection message, if the user request is not accepted, while visiting the first node; and

incrementing the rejection counter.

59. The method of claim 58, further comprising:

playing a second rejection message, if the user request is not accepted a second time, while visiting the first node;

incrementing the rejection counter; and

playing a last resort rejection message if the rejection counter has reached a threshold.

60.   A method of navigating a form node in a navigation tree derived from a document having content formatted in conventional markup language format, the navigation tree having a default grammar and one or more nodes, said method comprising:

5   visiting a first node in a navigation tree, said first node referencing one or more fields, each field defined by at least a keyword;

building a navigation grammar by adding to the default grammar one or more keywords defining said one or more fields;

determining if the first node is navigable;

10   if the first node is navigable then performing the following actions:

generating a first output message based on the keywords defining the fields, providing the option to select from one or more of said fields;

playing the first output message;

receiving a user request responsive to the first output message;

15   matching the request against the keywords included in the navigation grammar;

recognizing the request, if a close match is found between the request and one or more keywords included in the navigation grammar;

rejecting the request, if a close match is not found;

20   resolving ambiguities in the request, if a match is not recognized or rejected;

visiting a field defined by the keyword matched with the request, if the request is recognized;

building a second output message based on the keyword matched

25   with the request, providing an option to edit the field visited;

playing the second output message;

receiving a second user request to edit the field visited, responsive to the second output message; and

editing the field visited in response to said second user request.

30

-86-

61.   The method of claim 60, further comprising:

if the first node is not navigable then performing the following actions:

visiting said one or more fields;

building a second output message for a visited field based on the
keyword defining that field;

playing the second output message providing an option to edit
the field;

receiving a second user request to edit the field, responsive to said
second output message; and

editing the field in response to said second user request.

62.   A method of navigating a content node in a navigation tree derived from a
document having content formatted in conventional markup language format, the
navigation tree associated a default grammar, said method comprising:

visiting a first node in a navigation tree, said first node referencing first
content and a second content included in a conventional markup language document,
each content defined by at least a keyword;

generating a navigation grammar by adding to the default grammar keywords
defining the first content and the second content;

playing the first content; and

playing the second content.

63.   The method of claim 62, further comprising:

building an output message based on the keywords defining the first content
and the second content, providing the option to select one of the contents;

playing the output message;

receiving a user request responsive to the output message;

matching the request against the keywords included in the
navigation grammar;

-87-

recognizing the request, if a match is found between the request and one or more of the keywords included in the navigation grammar and playing the content defined by the keyword matching the request;

rejecting the request, if a close match is not found; and

5   resolving any ambiguities in the request, if the request is not recognized or rejected.